

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

December 8, 1993

MEMORANDUM FOR: G. W. Cunningham

COPIES: Board Members

FROM: T. Arcano

SUBJECT: Nevada Test Site, Device Assembly Facility (DAF); Trip Report for October 26-29, 1993

1. Purpose: This memorandum summarizes the observations of Defense Nuclear Facilities Safety Board (DNFSB) technical staff during the initial review of the Device Assembly Facility at the Nevada Test Site (NTS) from October 26 - 28, 1993. This review was conducted by T. Arcano, F. Bamdad, A. Gwal, A. Hadjian, and J. Preston and forms the basis of a systems engineering-based DNFSB DAF Review Plan.

2. Summary: The DAF review covered a broad range of topics including: safety analysis, nuclear explosive safety studies, preparations for operational readiness, structural and seismic design, quality assurance, electrical and ventilation systems, fire protection, and configuration management. The purpose of the review was to identify, from a systems engineering viewpoint, issues which warrant further DNFSB staff effort. Future DAF reviews will focus on these issues, concentrating on DNFSB staff in-house review of documentation with minimal reliance on site visits.

3. Background:

The DAF was designed to consolidate NTS nuclear explosive operations into a single, centrally located facility. It was designed in the mid-1980's to DOE Order 6430.1, General Design Criteria, as a non-nuclear explosives facility. The DAF will provide facilities to assemble devices comprised of Special Nuclear Material (SNM) containing subassemblies and high explosive (HE) material. It will be used by the Los Alamos and Lawrence Livermore National Laboratories (LANL and LLNL).

The DAF is a heavily reinforced concrete multi-structure building complex containing approximately 100,000 square feet of floor space located within a 22 acre, high security exclusion area in the central portion of the NTS. It is comprised of the following buildings: five assembly cells, three assembly bays, four high bays, two radiography buildings, five HE/SNM staging bunkers, a device processing laboratory, a primary and secondary alarm station, shipping bays, two guard towers, and an administration area. Except for its front, the DAF is covered by an earthen berm.

The DAF's radioactive material containment features include "gravel gertie" composite

roofs, special doors, and special ventilation features such as high efficiency particulate air (HEPA) filters and blast activated valves. The assembly cells and bays have been built to specifications derived from the over-pressure tests conducted for Pantex.

In February, 1985, the first work order for preliminary site construction was assigned to the Reynolds Electrical and Engineering Company (REECo), a DOE/NV prime management and operating contractor at the NTS. DOE/NV entered into a Memorandum of Understanding with the U. S. Army Corps of Engineers (USACE) to perform construction management for the DAF buildings. The prime contractor for the USACE was Hensel Phelps Construction Company which started constructing the DAF in January, 1988.

In May, 1992, based on a forecast of only three or four tests per year, DOE decided to complete only one-half of the DAF, and canceled contracts for approximately half of the special blast doors required for the facility. In May, 1993, DOE decided to complete construction of the entire facility, but only operate half.

At the time of this review, the facility was essentially complete with the exception of installing special blast-proof doors, security and communications systems, and a radiography machine, as well as resolving backfit and punchlist items, and miscellaneous finish work.

DOE's current schedule reflects the DAF being capable of operations in February 1995. DOE requirements to start up the facility include: an approved Final Safety Analysis Report (FSAR), Nuclear Explosive Safety Studies (NESS), an Environmental Assessment (EA), and the successful completion of an Operational Readiness Review (ORR).

4. Discussion: The purpose of this review was to identify, from a systems engineering viewpoint, issues which warrant further DNFSB staff effort. Future DAF reviews will focus on these issues, concentrating on DNFSB staff in-house review of documentation with minimal reliance on site visits. DAF issues which at this time appear to warrant further DNFSB Staff review include:
 - a. Safety Analysis: At the time of this review, the draft DAF Final Safety Analysis Report (SAR) was in its final stages of development under the precepts of DOE Order 5481. IB, Safety Analysis and Review System. Specific safety analysis issues for further review include:
 - DOE Order 5481. IB does not provide as stringent requirements as the more recent DOE Order 5480.23, Nuclear Safety Analysis Reports, and, in particular does not address all safety issues related to a hazard category 2 facility such as the DAF.
 - It is unclear whether a consistent device assembly capacity figure is being used for the development of the SAR, NESS Master Studies, and the

associated quantitative risk assessments. The current SAR draft is based on ten assemblies per year. However, the DAF was sized for approximately forty devices per year, and has the potential to be used with much higher through-put.

- The draft SAR uses different and smaller estimates for the fraction of plutonium dispersed in respirable size due to an explosion than does Pantex (8 for the DAF versus 20% for Pantex).
 - It does not appear that DOE is taking an integrated systems approach to DAF safety analyses and operational strategy development. Mismatches appear to exist between the SAR and NESS processes, between the NESS process and maintenance program development effort, and between the SAR and maintenance development effort as well.
- b. Nuclear Explosive Safety Study (NESS): DOE and the user groups intend to "update" the Area 27 Assembly, Storage, and Transportation (AS&T) NESS Master Study for application to the DAF. The DNFSB has raised concerns about the adequacy of the Area 27 Master Studies, including the AS&T NESS. It is unclear at this time what the DAF update will entail, and whether it will be adequate.
 - c. Quality Assurance: No integrated quality assurance program existed during the design and construction of the DAF. It appears that most subcontractors applied whatever quality assurance programs they had, with no requirement to use consensus standards such as NQA-1. Little, if any, quality oversight was provided by the DOE.
 - d. Post-Installation Testing: The DAF does not have a plan which addresses postinstallation testing and verification of DAF components critical to safety. It is not clear whether the extent of post-installation testing and verification is adequate.
 - e. Emergency Preparedness: DOE-NVOO has an extensive emergency preparedness and response capability at NTS, which is activated in association with nuclear tests. It is not clear that DOE has examined whether it is appropriate to exercise this capability at some reduced level for device assembly work.
 - f. Design: Questions still exist in the areas of seismic, fire protection, ventilation, and electrical design. Seismic concerns include the design basis, behavior of longitudinal and transverse expansion joints, and lack of seismic qualification of critical equipment (including emergency lighting and fire panels).
5. Future Staff Actions: DNFSB staff will implement the DNFSB DAF Review Plan which includes:

- a. Conducting a detailed review of the draft SAR, when available. As well, DNFSB Staff will follow the concept of defense in depth and its application at the DAF.
- b. Addressing overall NTS NESS adequacy issues with DOE Headquarters and DOENVOO prior to approval of the NESS Master Studies for the DAF.
- c. Reviewing key aspects of the DAF design and construction in order to evaluate whether an adequate degree of confidence of quality in the design and construction of DAF exists.
- d. Determining the adequacy of post-installation testing and verification.
- e. Monitoring DOE's development of an emergency preparedness posture for the DAF.
- f. Monitoring DOE plans for an operational readiness review of the DAF, including the issue of order compliance. (As the time for the ORR approaches, Training and Qualification, and Radiation Protection reviews may be warranted.)
- g. Conducting limited scope reviews in selected areas of seismic, electrical, fire protection, and ventilation safety.